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ABSTRACT

This paper, one of a series which arose out of data gathered on Choctaw Indians, Negroes, and whites in a low income area of Mississippi, expands upon one aspect of a recently completed analysis by the author. In the study, an attempt was made to distinguish between the characteristics associated with income levels and those related to ethnic group affiliation for the three ethnic groups. In the analysis, clustering techniques applied to the data demonstrated that there were differences among the groups greater than would be expected if income level alone were the determinant. This was done by controlling for income level in all analyses. The data variables were patterned by ethnic affiliation rather than income level. This is significant for several reasons: (1) It provides a means of verifying formally patterns which are derived from traditional participant-observation techniques; (2) it provides a way of critically analyzing high level abstractions such as Lewis' "culture of poverty" concept; and, (3) in terms of guided social change programs, it provides data on differences which may be of benefit to educators and administrators in setting guidelines for program implementation. [Not available in hard copy due to the size of the print and marginal legibility of parts of the original document, particularly some of the graphs.] (Author/JM)

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Cluster Analysis in Minority Group Poverty Studies*

by

E. Lamar Ross (LSUNO)

This paper, one of a series[1] which arose out of data gathered on Choctaw Indians, Negroes, and Whites in a low income area of Mississippi (see Table 1 and Map 1) during 1960-1961[2], 1961-1962[3], and 1968-1969[4], expands upon one aspect of a recently completed analysis by the present author (Ross 1970). In the study, an attempt was made to distinguish between the characteristics associated with income levels (see Figure 1) and those related to ethnic group affiliation for the three ethnic groups.

In the analysis, clustering techniques applied to the data demonstrated that there were differences among the groups greater than would be expected if income level alone were the determinant. This was done by controlling for income level in all analyses.

The data variables patterned by ethnic affiliation rather than income level. This is significant for several reasons: (1) It provides a means of verifying formally patterns which are derived from traditional participant-observation techniques, (2) It provides a way of critically analyzing high level abstractions such as Lewis' "culture of poverty" concept, and (3) In terms of guided social change programs, it provides data on differences which may be of benefit to educators and administrators in setting guidelines for program implementation.

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* Presented at the 1970 annual meeting of the American Anthropological Association, San Diego, California. As this is a working paper, the author would appreciate any comments.

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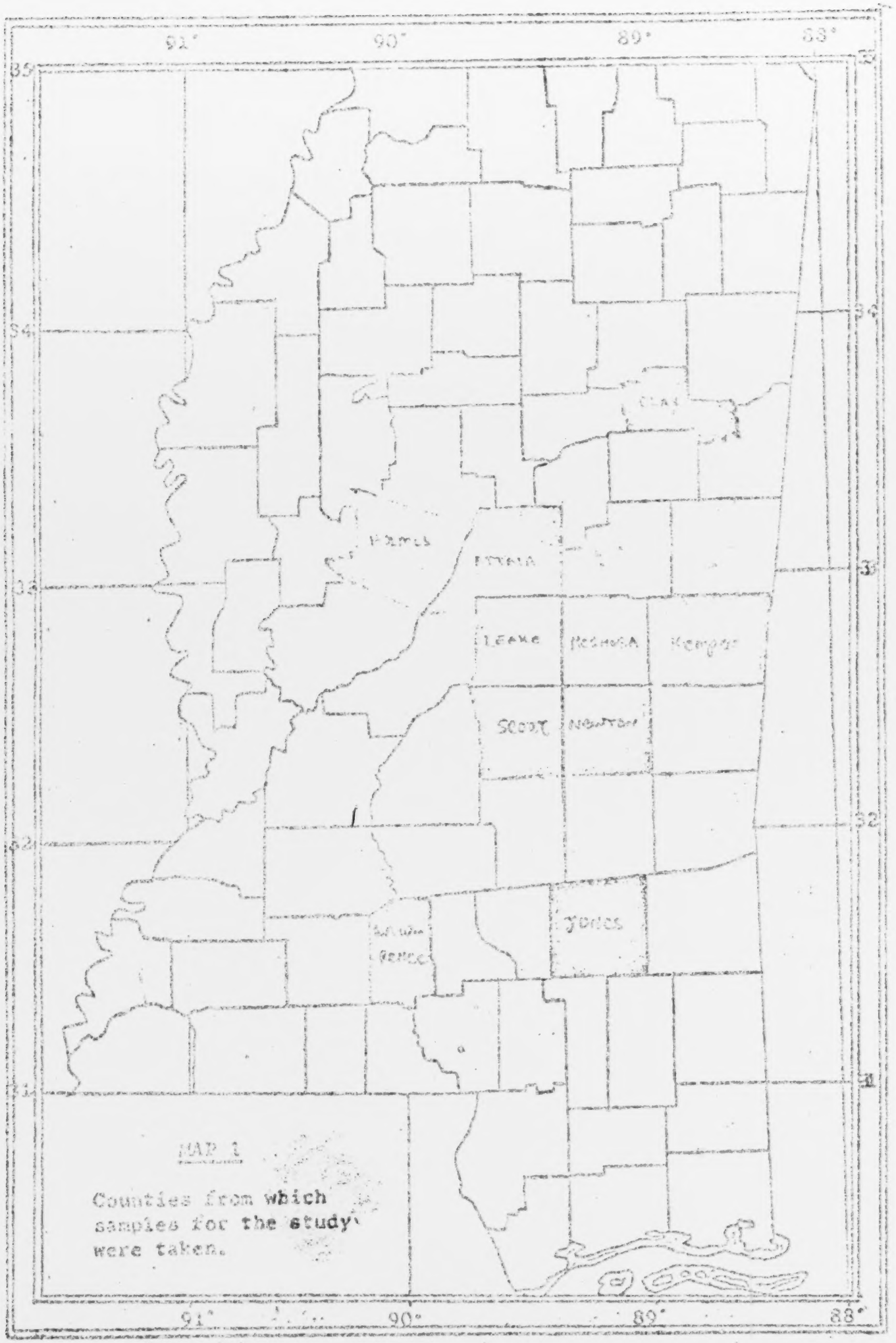
TABLE 1 COUNTIES FROM WHICH SAMPLES WERE DRAWN AND NUMBER OF HOUSEHOLDS INTERVIEWED *

County (and Indian Communities)		Number
Choctaw (includes counties in parentheses)		
Red Water (Attala, Leake)		12
Standing Pine (Leake)		8
Bogue Chitto (Kemper, Neshoba)		79
Pearl River (Neshoba)		65
Tucker (Neshoba)		44
Conehatta (Newton, Scott)		93
Bogue Home (Jones)		24
	Total	323 **
Negro		
Clay		
Holmes		
Lawrence		
	Total	167
White		
Neshoba	Total	80 **

* Adapted from Ridley 1965:32. (Source for Indian information: Choctaw Indian Agency Area Map, Philadelphia, Mississippi, August 14, 1958).

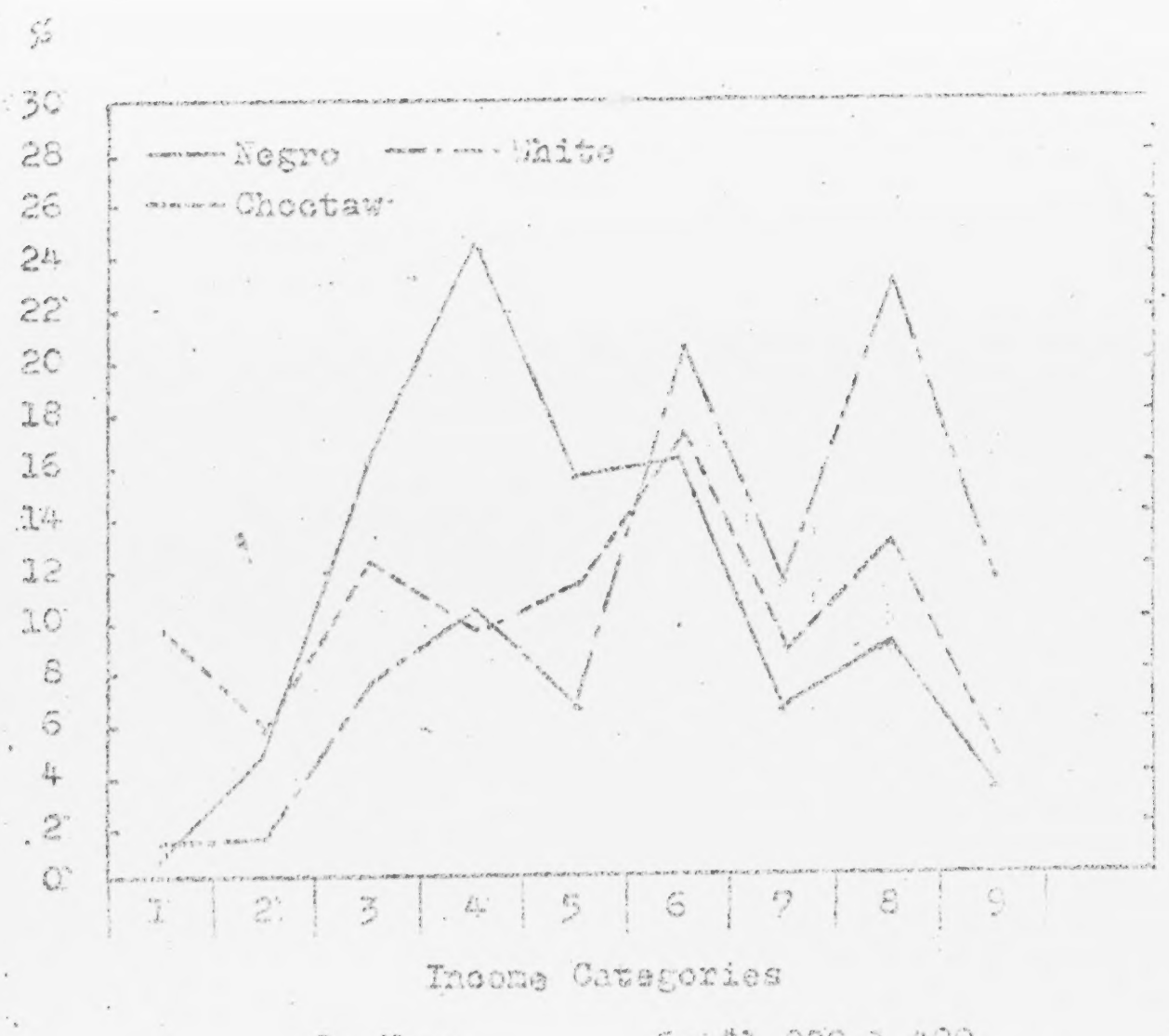
** The present study only included 23% of the Choctaw households. The others were omitted because a shortened interview schedule was used in which some of the pertinent data was not available. Only 79 of the 80 households were used for the Whites. One was simply not available.



MAP 1

Counties from which samples for the study were taken.

FIGURE 1 : GRAPHIC REPRESENTATION OF MODAL INCOME OF CHOCTAW, NEGRO, AND WHITE BY PERCENTAGES IN EACH CATEGORY



1= None
2= $1-249
3= $250-499
4= $500-749
5= $750-999
6= $1,000-1,499
7= $1,500-1,999
8= $2,000-3,999
9= $4,000 or More

DATA SOURCE AND EVALUATION

The data for the study came from two sources. The first, that for the Negroes and Whites, is the Southeastern Regional Rural Sociology Project S-44 entitled "Factors in the Adjustment of Families and Individuals of Low-Income Rural Areas of the South." It was gathered in 1960 and 1961. The research included households in the seven following states: Alabama, Kentucky, Louisiana, Mississippi, North Carolina, Tennessee, and Texas. A stratified random sample was designed

> to discover and examine the social, psychological and communication factors associated with family adjustment or with the attainment of a level-of-living consistent with regional and national standards. (Globetti, 1963:49; quoted in Austin, 1966:31).
>
> A write-in interview schedule was structured so that the interviewers would ask the same question in the same way in all the states. The completed interview schedules for each family head and homemaker were edited by the interviewer, and re-edited by a field director. (Austin 1966:32)

For the present study, 167 interview schedules for the Negro households were utilized and 79 for the Whites. These were all from Clay Hills area of Mississippi near Philadelphia.

The following year, at the request of the Bureau of Indian Affairs, Dr. Wilfrid C. Bailey designed a study of the Choctaw Indians which would provide data comparable to that already available for the Negroes and Whites. Trained members of the Bureau of Indian Affairs' staff conducted the interviews in 1962.

Ten counties from the Clay Hills area were included in the samples obtained (see Table 1 and Map 1 for distribution by ethnic group). All the Whites resided in Neshoba county. Three of the Indian communities were at least partially in Neshoba county with the remaining four being found in the adjoining counties of Leake, Attala, Kemper, Newton, Scott, and Jones. The Negro data represented Clay, Holmes, and Lawrence counties.

The size of the samples was not uniform. The interview schedules for the Choctaws represented approximately 65 percent of the households in the area. Due to the fact that part of the schedules were of a preliminary nature and did not contain information on all the variables, 89 schedules were not utilized in this study. This still leaves the Choctaw being represented by almost 50 percent of the households in these counties.

The percentages for the Negro and White households were not available. The number of Negro households utilized was 167 and the number of Whites, 79.

Since the data upon which this exercise is based dates from 1962, it needs to be pointed out that new data on the Choctaw is now available which was gathered in 1968[6]. This new data will provide a data source from which significant new analyses can be made.

ANALYTIC PROCEDURES

Process of analysis. Sixty-one comparable variables for each ethnic group were chosen according to their availability and coded on computer cards for analysis. The analysis was done in two steps.

1. To ascertain if the suspected differences in household characteristics would still be maintained if income was controlled, a correlation coefficient (C) was computed for all variables by ethnic group controlling for income (see Table 2). This indicated that there were certain patterns developing by ethnic group even in cases which income was the same for each group.

2. The most consistent differences by ethnic group appeared among the thirteen variables classified as family characteristics. These family characteristics upon which to perform a cluster analysis. If significant associations between the family characteristics and the ethnic affiliation did exist, the congruence profiles based on the cluster analyses would differ for each ethnic group. If, on the other hand, there was no significant association between the family

TABLE 2. LIST OF HOUSEHOLD CHARACTERISTICS BY CATEGORY AND CORRELATION COEFFICIENTS (C) BETWEEN TOTAL FAMILY INCOME (X) AND OTHER VARIABLES (Y) ARRANGED FOR COMPARISON BY ETHNIC GROUP

Household Characteristics

Categories, variable number and variable label	Choctaw N = 234	Negro N = 167	White N = 79
I. Residence and tenure			
46. Census type residence	.383	.287	.338
47. Acres farm land owned	.827	.557	.529
48. Home tenure	.259	.269	.359
49. Farm tenure classification	.588	.484	.493
II. Family characteristics			
1. Size of household	.551	.555	.707
2. Sex of head	.260	.348	.536
3. Marital status of head	.472	.482	.581
4. Family type &	.524	.533	.619
5. Age of head	.472	.554	.661
6. Age of homemaker	.497	.547	.686
7. Education of head	.553	.611	.691
8. Education of homemaker	.522	.636	.676
9. Household dependency index score †	.401	.444	.626
10. Stage in family cycle	.486	.533	.618
11. No. of rooms in house	.437	.523	.598
36. Participation index of head	.379	.638	.665
37. Participation index of homemaker	.339	.518	.655
III. Work characteristics			
38. Present occupation of head	.647	.696	.643
39. Present work status of head	.329	.247	.422
40. Present occupation of homemaker	.431	.536	.685
41. Different types of work of head in past five years	.421	.554	.607
42. Type of work change of head in last five years	.425	.650	.580
43. Work most like to do	.617	.589	.692
44. Work expects in five years	.661	.696	.688
45. Reason for conflict	.525	.553	.725
IV. Income characteristics			
50. Gross income from crops	.722	.682	.658
51. Income from livestock	.750	.466	.638
52. Government payments in connection with farm program	.142	.323	.312
53. Total gross farm income	.758	.706	.629
54. Total net farm income	.758	.706	.629
55. Welfare income for past year	.645	.501	.671

TABLE 2. (continued)

Categories, variable number and variable label	Choctaw N = 234	Negro N = 167	White N = 79
IV. Income characteristics (continued)			
56. Miscellaneous income	.408	.422	.425
57. Family non-work income	.654	.597	.739
58. Non-farm income of head	.697	.676	.724
59. Homemaker income	.492	.481	.647
60. Total family income from all sources	1.000	1.000	1.000
61. Total family net worth	.582	.512	.626
V. Consumer items			
12. Automobile	.379	.398	.452
*13. Truck	.252		
14. Electricity	.186	.315	.329
15. Telephone	.226	.340	.383
*16. Automatic dishwasher	0.000	.000	0.000
17. Television	.371	.346	.434
**18. Mechanical refrigerator	0.000	.316	.329
19. Home freezer	.395	.269	.434
20. Air conditioner	.147	.373	.283
21. Vacuum cleaner	.456	.370	.227
**22. Electric sewing machine	0.000	.314	.270
**23. Automatic washing machine	0.000	0.000	.302
24. Radio	.240	.239	.357
25. Piped water	.330	.409	.365
26. Hot water heater	.342	.463	.323
27. Inside flush toilet	.381	.470	.349
28. Bath or shower	.377	.470	.367
29. Kitchen sink	.326	.389	.353
30. Daily newspaper	.328	.250	.362
31. Weekly newspaper	.273	.460	.321
32. Farm or trade magazine	.274	.284	.260
33. Women's magazine	.328	.265	.233
34. Other magazines	.274	.446	.363
**35. Gas or electric range	0.000	.383	.521
Total number of highest and lowest correlations for each variable by ethnic category			
Total highest	8	15	35
Total lowest	34	15	11

[†]Family types are defined as follows:

(a) complete nuclear: husband and wife with or without children.
(b) incomplete nuclear: family in which one of the spouses is missing.
(c) extended family: complete nuclear family plus collateral relatives.
(d) stem-extended: nuclear family plus direct line relative in descending or ascending generation with the exception of unmarried children.
(e) joint- two or more complete nuclear families
(f) stem-joint- two or more complete nuclear families plus relatives
(g) incomplete extended- incomplete nuclear plus collateral relatives
(h) other- particular combinations of people who did not lend themselves to other family type categories.

(see Ridley, 1965:44)

[‡]The household dependency index score was developed especially for the S-44 sociological project from which the data of the present study is obtained in part. The formula follows:

$$D = \frac{1 * X}{1 + Y + Z}$$

Where: X = Number of individuals between 14 and 64 years old
Y = Number of individuals under 14
X = Number of individuals over 64

"The scores on the index ranged from .1 for those with the highest number of dependents relative to 4.0 or more for those with the lowest number of dependents relative to the number of non-dependent family members." (Ridley 1965: 63)

[‡‡]The participation index was constructed in the following manner:

"1 point for being a member of an organization
1 point for being active in the organization
1 point for being on a committee and/or being an officer

The addition of these points produced the total score for each head and homemaker." (Ridley 1965: 64).

The range in scores varied between 0 (no participation) and 10 or more points.

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*No correlations were available for the Negroes and Whites on this item because the information needed to compute the correlations was not available on the original interview schedules.

**In each of these cases a zero correlation indicated that the item was not possessed by any of the households although answers were given to the interviewer.

characteristics and ethnic affiliation, then there should be some overlap in the congruence profiles.

Clustering of the characteristics required two operations. First, the calculation of a B coefficient was made.

> This B coefficient is the ratio of the average of the intercorrelations of a subset of cluster of variables to their average correlation with all remaining variables in the whole set. Its value is independent of the order in which variables are introduced into the cluster (Clements 1954:182-183).

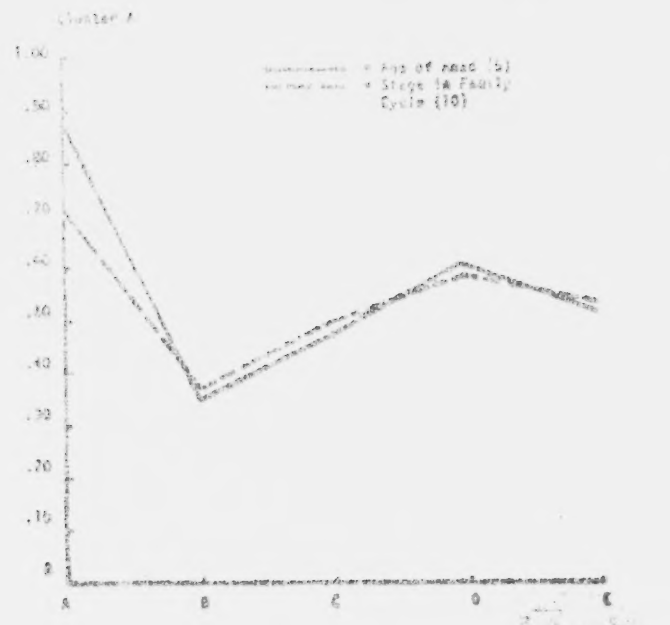
Second, the provisional clusters had to be tested graphically by constructing their profiles of congruence. Indications of cultural differences among the three groups would be indicated if the family characteristics either clustered differently or, in the case in which the clustered characteristics were the same, if they clustered in different patterns.

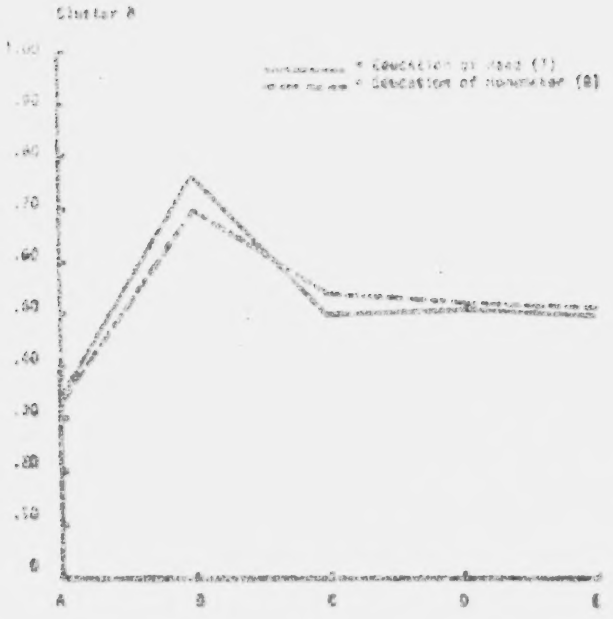
The particular method used for clustering was chosen for the simplicity with which it could be performed. This technique, developed by Forrest Clements (1954), can be used adequately with a calculator in cases where a computer is not available.

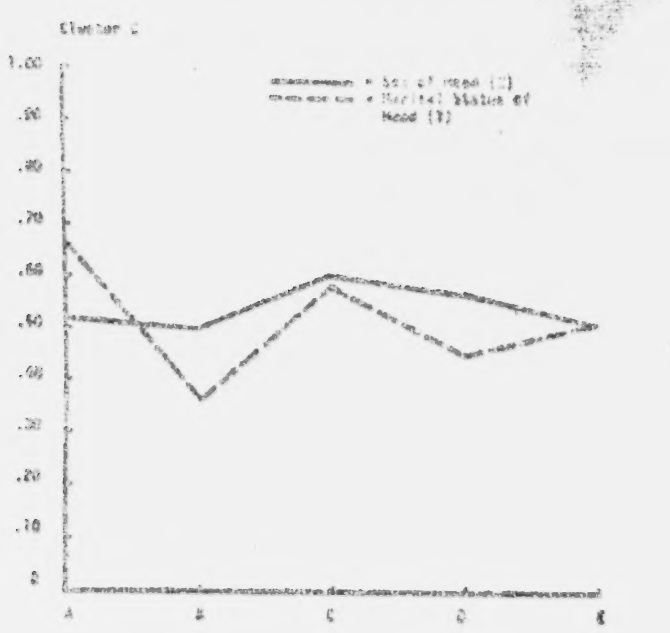
Cluster analyses for each ethnic group. The results of the cluster analysis performed on the family characteristics for each ethnic group are presented in Figures 2-4. In the graphs, the ordinate is the scale of Pearsonian r values[7] ranging from 0 - 1.00. In order to keep all of these positive, they were transmuted according to the formula

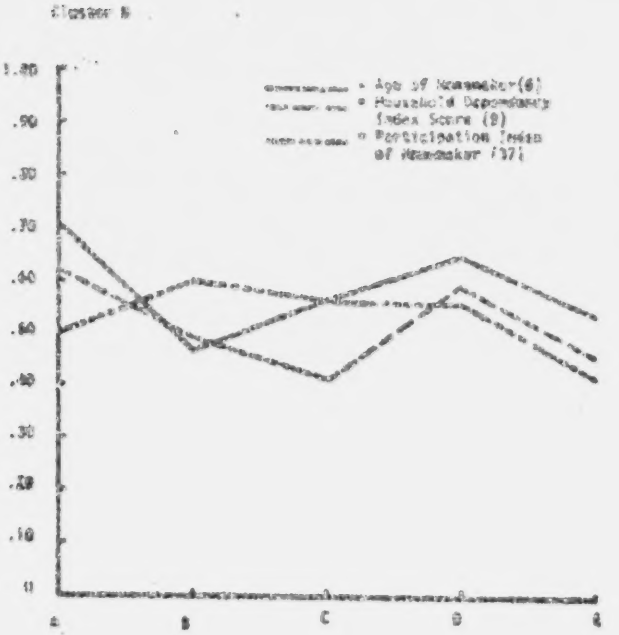
$$\frac{\pm r + 1}{2}$$

suggested by Clements (1954:191). The successive abscissae are the clusters themselves. The values used in plotting the congruence profiles are the average of the coefficients the members of each cluster have with the characteristics in each row of the correlation matrix of the family characteristics. Therefore each characteristic's profile demonstrates it's intercorrelations with each cluster. This was done for three ethnic groups.


Cluster A
Age of Head (5)
Stage in Family Life Cycle (10)
A
B
C
D
E


Cluster A
Education of Head (7)
Education of Homemaker (8)
A
B
C
D
E


Cluster C
Sex of Head (2)
Marital Status of Head (3)
A
B
C
D
E


Cluster D
Age of Homemaker(6)
Household Dependency Index Score (9)
Participation Index of Homemaker (37)
A
B
C
D
E

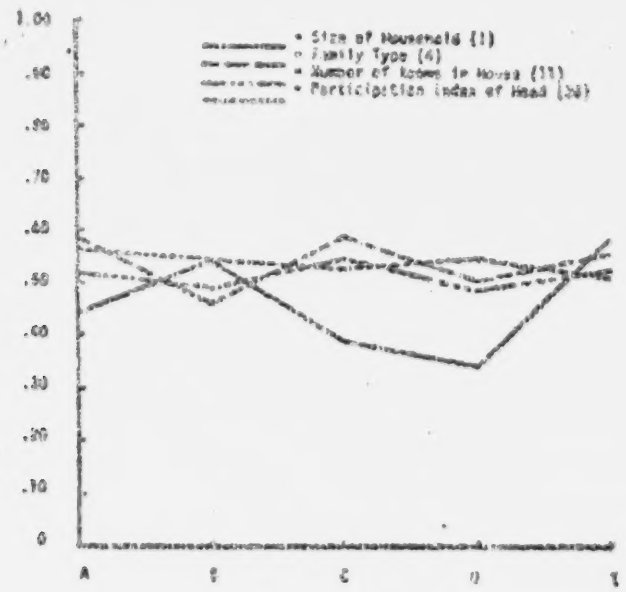
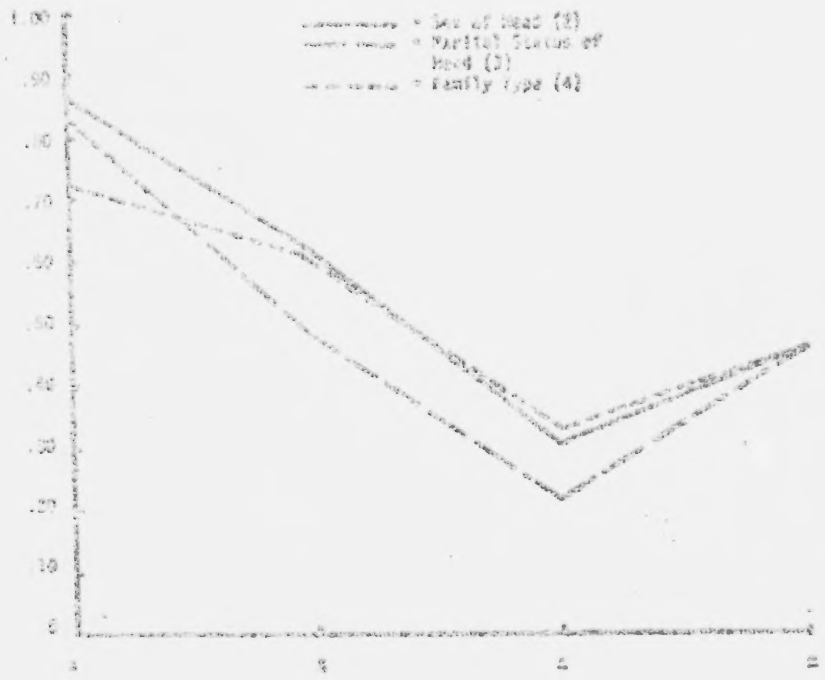
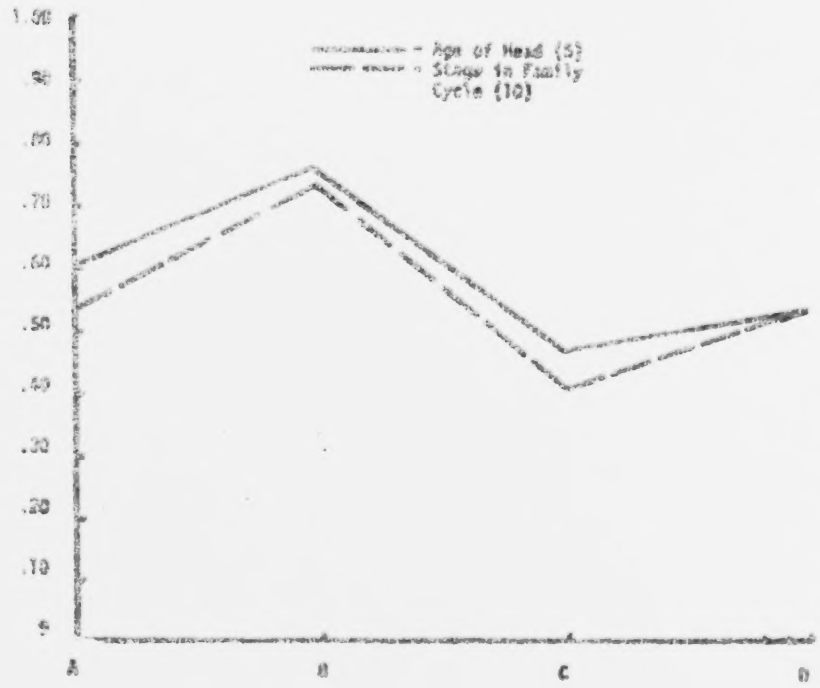

Cluster E
Size of Household (1)
Family Type (4)
Number of Rooms in House (11)
Participation Index of Head (36)
A
B
C
D
E

FIGURE 5. CONGRUENCE PROFILES of Family Characteristics for Negro Households

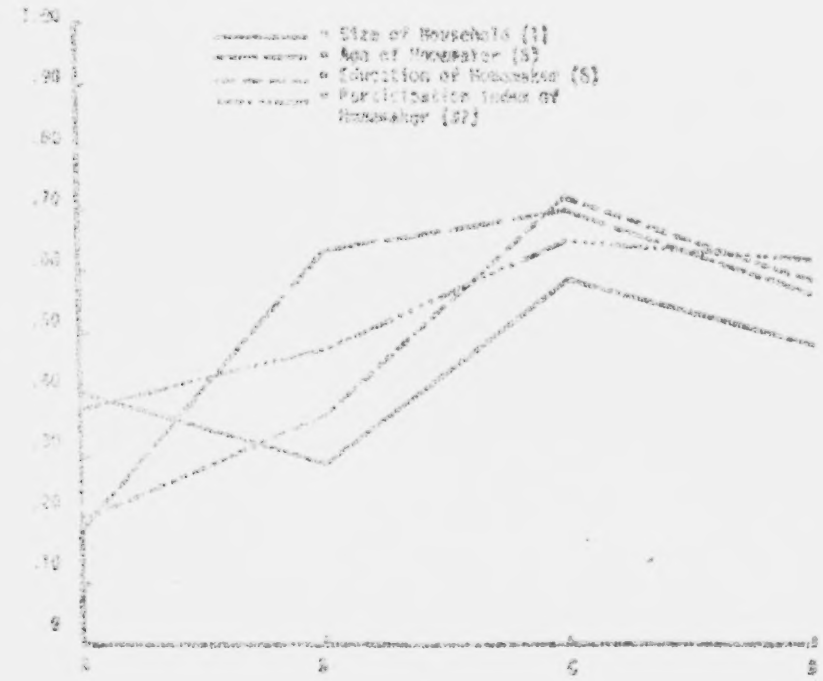
Cluster A



Cluster B



Cluster C



Cluster D

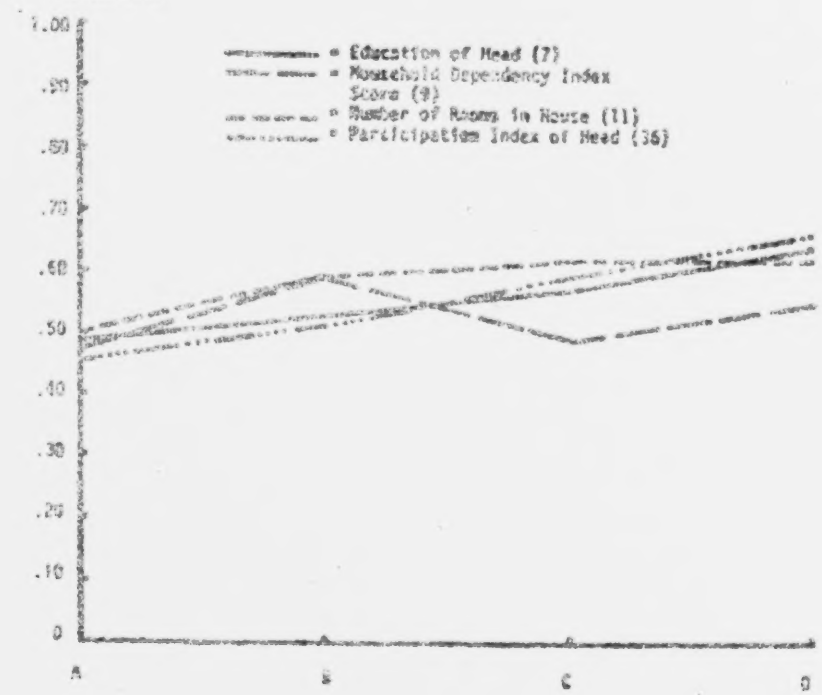
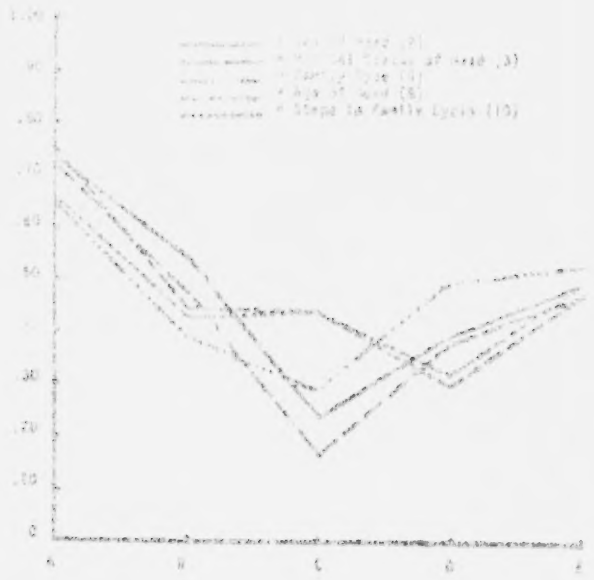
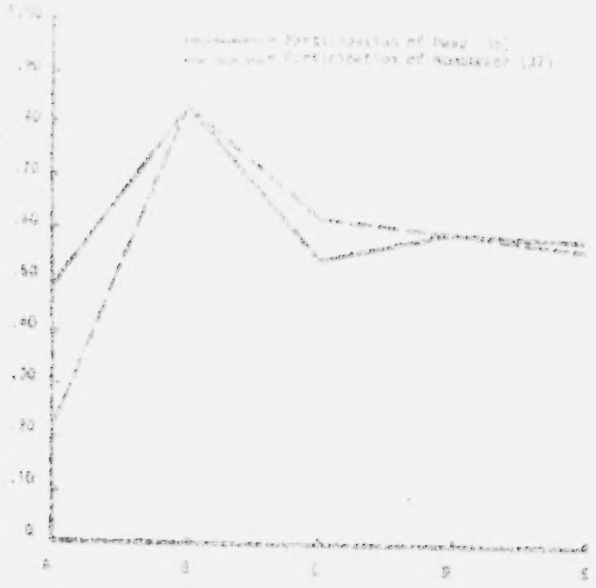


Table 4 — Summarized Profiles of Family Characteristics for Work Households

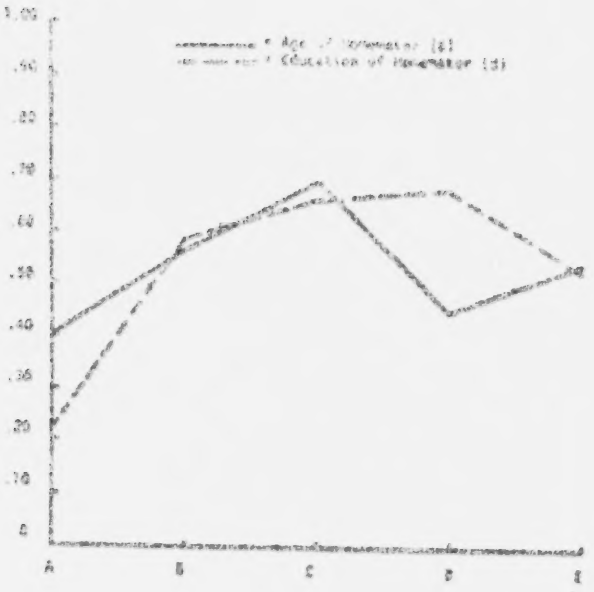
Cluster



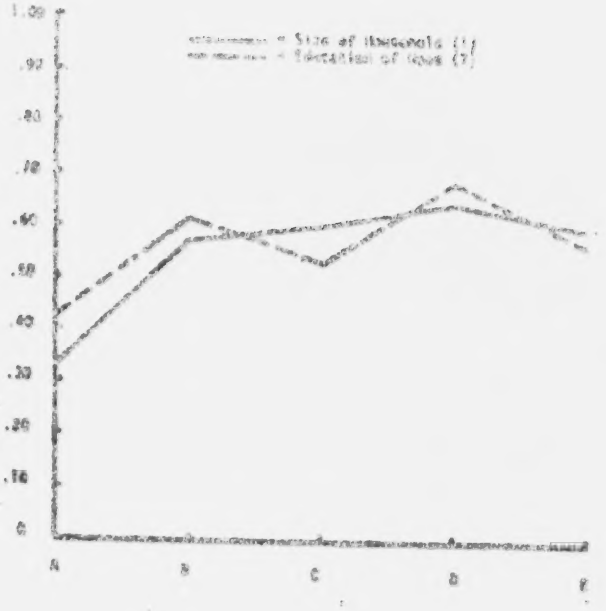
Cluster B



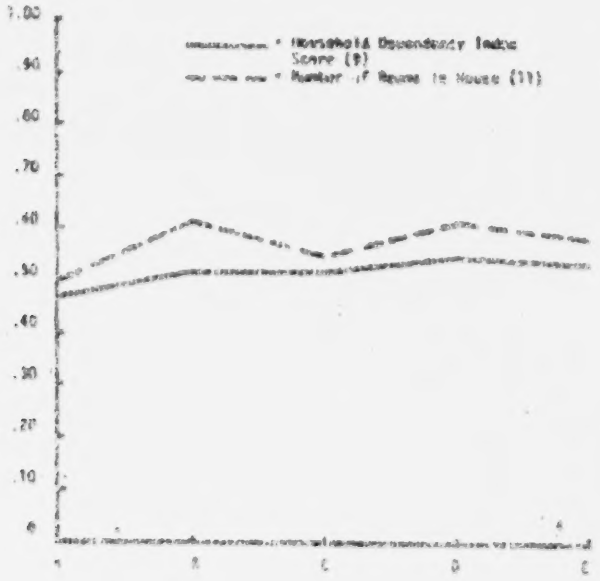
Cluster C



Cluster D



Cluster E



The family characteristics cluster in distinctly different patterns for the three groups. The number of clusters for the Negroes and Choctaw were the same, five in each case. The Negroes only had four.

Choctaw clusters. The figures for each group are arranged in descending order according to the degree of congruence as demonstrated by the calculated B coefficients. The highest congruence for the Choctaws occurred between the age of the head of household and the stage in family cycle of the head's nuclear family. The second cluster consisted of education of the head of household and the education of homemaker. The third cluster also consisted of only two characteristics, sex of head and marital status of head. The degree of congruence between the characteristics in the other two clusters was looser than those in the first three clusters. Cluster D, consisting of age of homemaker, household dependency index score, and participatinn index of homemaker displayed the loosest congruence of the final two clusters. The size of household had the least degree of congruence with the other members of Cluster E. The participation index of head, family type, and number of rooms in house showed a much closer pattern of congruence, with the two latter characteristics showing the highest congruence.

Negro clusters. Only one cluster for the Negro family characteristics had the exact same member characteristics as the Choctaw. This cluster (B) consisted of age of head and stage in family cycle. It was ranked second in degree of congruence for the Negroes, and first among the Choctaw. Cluster A; sex of head, marital status of head, and family type, was the only other cluster in the Negro group that closely approximated the Choctaw cluster, which lacked family type. The most loosely congruent cluster was Cluster C. It consisted of size of household, age of homemaker, education of homemaker, and participation index of homemaker. The participation index of homemaker had a close congruence with Cluster D. As is evident from the congruence profile (Figure 3), the members of Cluster D have the most congruent profile. This cluster consisted of education

of the head of household, household dependency index score, number of rooms in the house, and the participation index of the head of household.

Of the three ethnic groups, the calculations for the Negro family characteristics yielded the most highly congruent clusters, and those which had the least affinity with each other as evidenced by the congruence profiles. In the cases of the Choctaw and White clusters, more characteristics appeared to relate to other clusters.

White clusters. The White family characteristics proved the most difficult to cluster definitively. The clusters which are included in this study were from the fourth attempt at clustering. Each time it appeared that certain characteristics could best be included in a different cluster. New calculations were then made and congruence profiles drawn.

Even these final clusters appeared to be non-conclusive. At first glance it appears that Cluster A, consisting of sex of head, marital status of head, family type, age of head, and stage in family cycle could be broken down into two clusters, with age of head and stage in family cycle forming a separate cluster as they did in the case of the Negroes and Choctaw. It also appears that possible Cluster D and E might best be combined. Calculations for the family characteristics were made to test this out and the congruence profiles thus derived did not bear out the distinction, therefore the present profiles are considered to be the best manner of breaking down the clusters. The conclusion is that the clusters derived for the Whites are not as distinctly different from one another as were those for the Choctaw and Negro households.

The second cluster, B, contained the participation index of the head of household and the participation index of the homemaker. There is a distinct difference between the ranked position of these indices for the Whites (second) and for the Choctaw and Negro households where they were included in the last two clusters.

Cluster C consisted of age of homemaker and education of homemaker. Cluster D and E, as already mentioned, had the closest affinity. A glance at the characteristics of which these are composed demonstrates that, viewed in terms of what we know of American middle class White society, this is expected. Cluster D contained size of household and education of head. Cluster E contained household dependency index score and number of rooms in house.

It is apparent that there are differences in both the number of clusters for each ethnic group and the family characteristics of which each is composed.

Implications of Results

The above exercise demonstrates that cluster analysis as a tool in poverty studies can be a significant aid to research in various ways. It formally verifies patterns of cultural diversity which are derived from such traditional techniques as participant-observation. This in itself justifies using the technique.

Directed social change programs would also benefit from the findings derived from such analyses. Poverty programs as operated by the United States Government today generally operate under the assumption that all poverty groups are the same culturally. The present study indicates that this is a false assumption. To be fully effective, these socio-cultural differences, which have at least as much association with ethnicity as income level, should be considered in formulation of program goals and procedures. Cluster analysis can serve as an effective tool in defining such cultural variations, and when coupled with more traditional in-depth study procedures, leads to a quicker grasp of significant cultural differences.

The findings of this study suggest that the "culture of poverty" concept may be too abstract for utilization in terms of program planning. Care should be used when accepting the generalizations explicit and implicit in its construction.

There is a need for greater in-depth analysis of groups classified as "poverty" groups, particularly as regards Oscar Lewis' conceptualization of their sub-cultural similarities. He gives total income level the role of an independent variable upon which all other aspects of culture are at least partially dependent. When we say "partially" dependent, one must agree. Methodologically, the underlying assumption appears to be that total income is an independent variable upon which all other variables are dependent.

The situation is considerably more complex than this simple assumption. Anthropologists generally agree that culture is an integrated system of learned, acquired behavior, ideas, beliefs, etc. Further, it is generally agreed that changes in one aspect of culture influence to some degree all other aspects of culture. If this is true, then we cannot theoretically or methodologically consider one particular variable as being independent. All cultural traits must be inter-dependent.

An adequate analysis of poverty groups should encompass a multitude of traits, all considered as dependent variables. The magnitude of such a study a few years ago would have been beyond the capabilities of most individuals due to the time factor in completing such an analysis. Today, with the advent of computers that can accomplish computations in seconds that once took one individual months to accomplish laboring over a calculator eight hours a day, such an analysis is not only possible but relatively easy to accomplish. Variations can be noted in patterning of variables which participation in and subjective evaluation of a culture would be unlikely to give. Combine this type of analysis with traditional human involvement and the result should be a more nearly complete understanding of the cultural mechanisms involved in socio-cultural differences among poverty groups.

Of all the mathematical and quasi-mathematical techniques being used in anthropological methodology today (Biennial Review of Anthropology 1969), clustering is probably one of the least sophisticated. The insights which one can

gain however from using it and its simplicity of execution make it a beneficial tool for anthropological research among minority poverty groups, and especially for comparative purposes when planning programs of social change. Although the exercise utilized a limited amount of data for each of the three groups, the indications are that, with more comprehensive analysis of large amounts of comparative data, the significance of clustering as a principal or secondary technique of analysis could be greatly increased.

NOTES

1. Byars (1965), Ridley (1965), Austin (1966), Peterson (1970a), Ross (1970), and Ross and Bailey (1970).

2. The data for the Negroes and Whites were gathered as part of the Southeastern Regional Rural Sociology Project S-44 entitled "Factors in the Adjustment of Families and Individuals of Low-Income Rural Areas of the South".

3. Dr. Wilfrid C. Bailey, at the request of the Bureau of Indian Affairs, completed a study of the Choctaw Indians emphasizing question which would make the data comparable with the S-44 Project.

4. John H. Peterson (Mississippi State University) gathered data among the Mississippi Choctaw for his Ph.D dissertation (1970a). A follow-through study on Negroes and Whites has also been completed as a complement to the earlier S-44 Project. The availability of this data makes feasible comparative in-depth studies of the poverty level groups through time, creating the possibility of arriving at processual socio-economic and socio-cultural changes in the last decade. A brief report on the socio-economic characteristics of the Mississippi Choctaw Indians from Peterson's data has also been published recently (1970b).

5. Clustering techniques have been used in various ways by anthropologists, the most abundant early use being the analysis of culture areas initiated by Boas and Kroeber. Driver points out that Kroeber used clustering as early as 1894 (Driver 1962:14-17) and various other anthropologists have utilized it since (e.g. Barrett, 1908; Czekanowski, 1911; Clements, Schenk, and Brown, 1926; Klimek, 1935; Clements, 1954; Hodson, 1970; and Levin, 1970). Each used clusters in differing manners and applied clustering to diverse problems.

6. John H. Peterson, Jr. 1970a and 1970b.

7. The ideal coefficient for performing the cluster analysis would have been the coefficient of contingency used in determining the correlations between income level and the sixty-one household characteristic variables. This was not done due to the unavailability of a computer program to provide the matrix needed for clustering. The decision was then made to use the Pearsonian r coefficient.

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